No. 639,155. Patented Dec. 12, 1899.

R. M. DOWNIE.

DREDGER FOR USE IN WELLS.

(Application filed Sept. 11, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

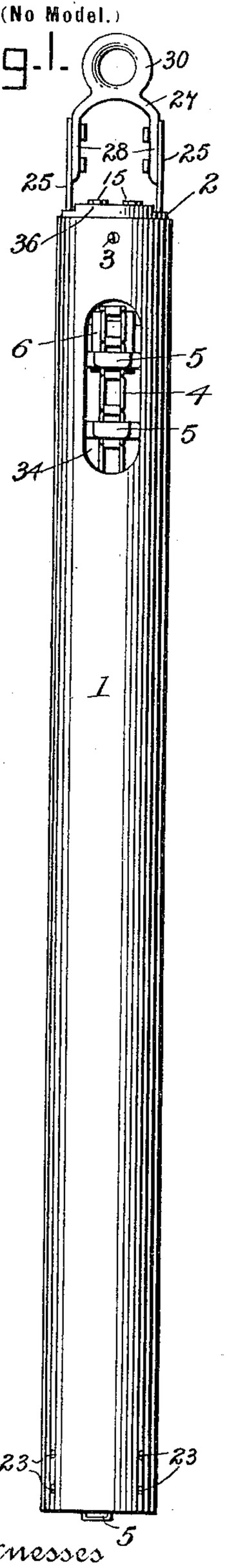

Fig. 2.

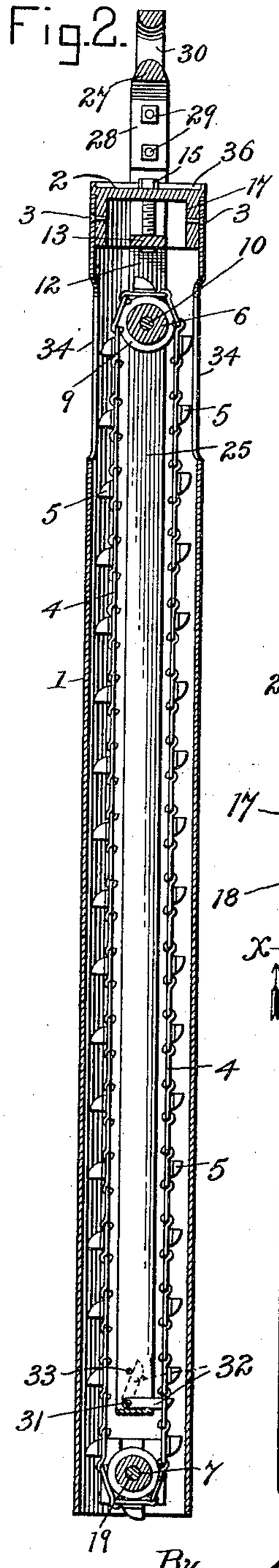

Fig. 3.

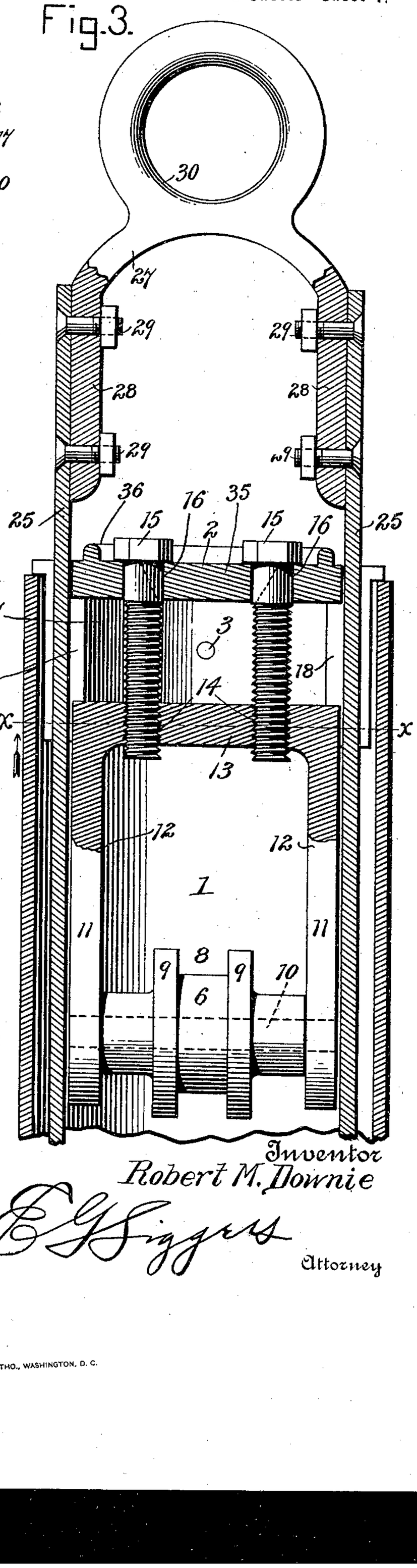

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Fig. 4.

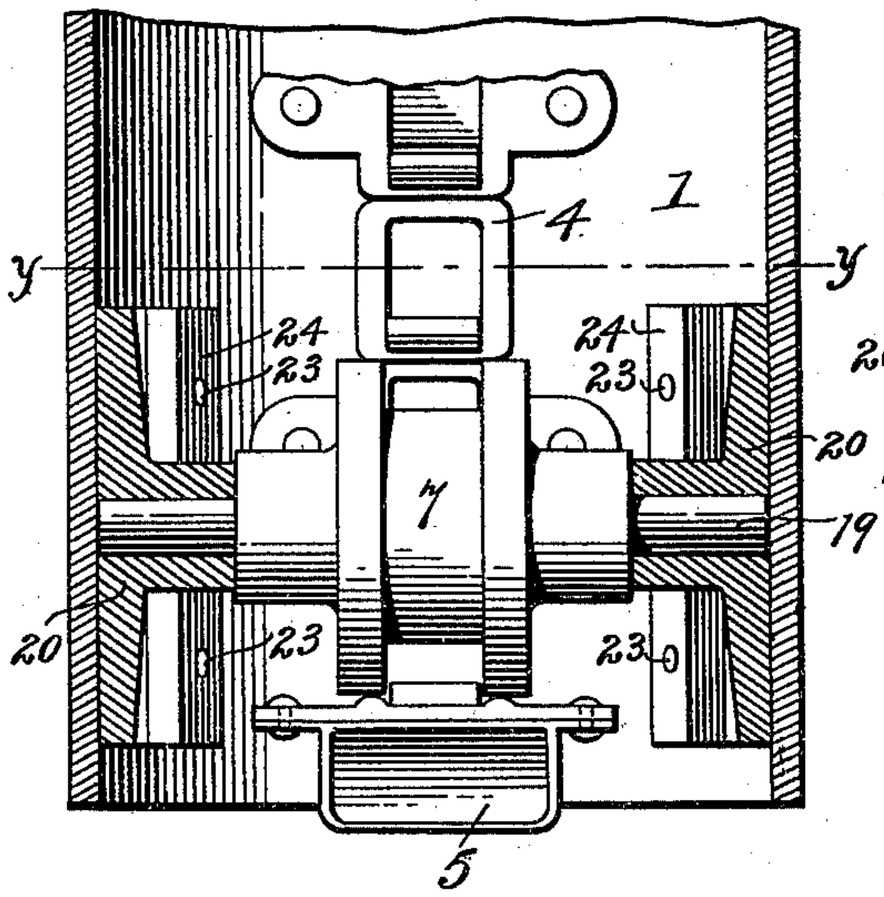


Fig. 5.

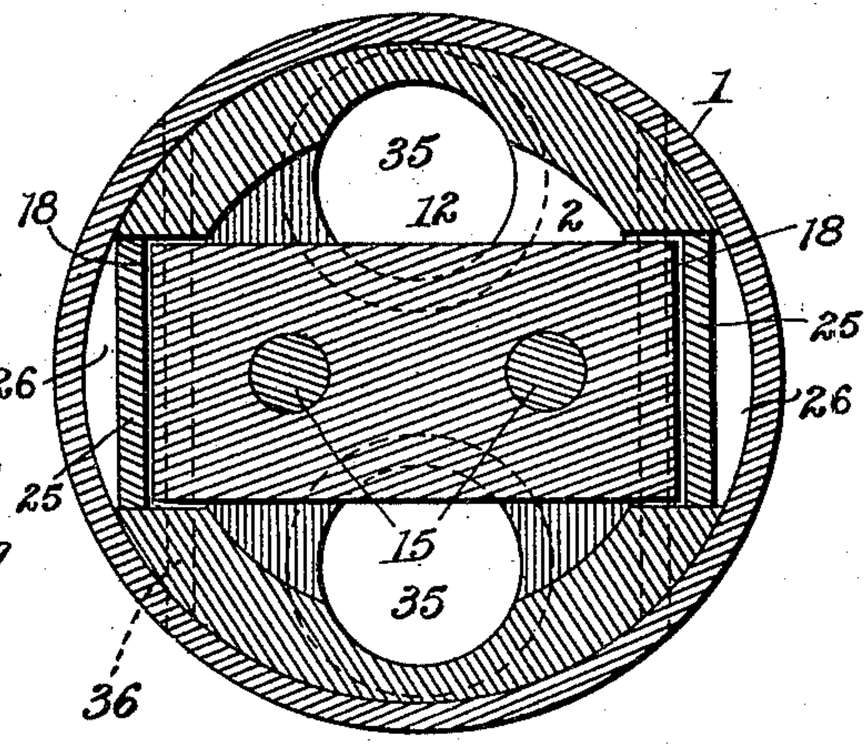


Fig. 6.

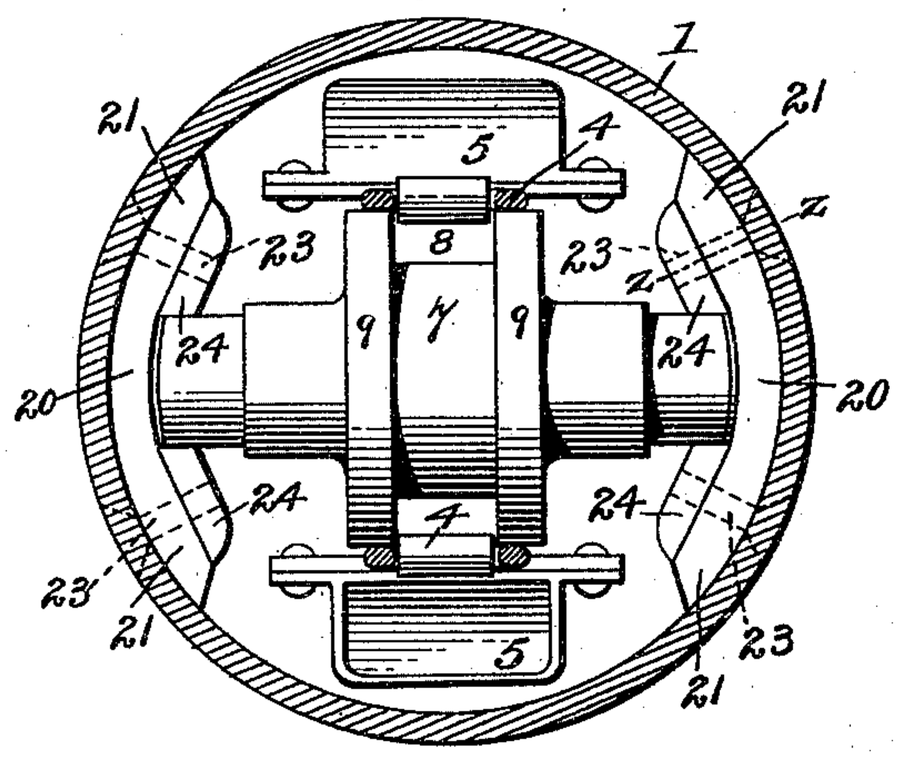
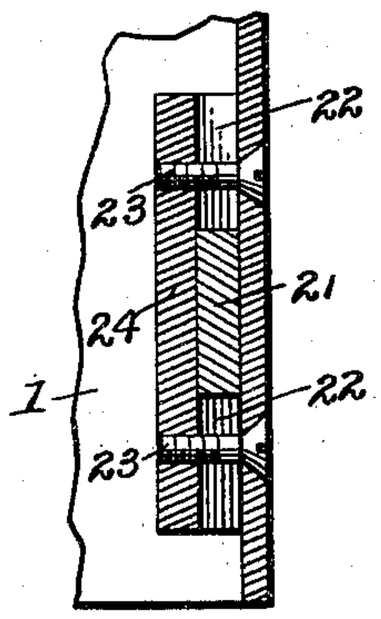


Fig. 7.



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R. M. Smith.

Robert M. Downie Inventor

By E. G. Siggers Attorney

UNITED STATES PATENT OFFICE.

ROBERT M. DOWNIE, OF BEAVER FALLS, PENNSYLVANIA, ASSIGNOR TO THE KEYSTONE DRILLER COMPANY, OF SAME PLACE.

DREDGER FOR USE IN WELLS.

SPECIFICATION forming part of Letters Patent No. 639,155, dated December 12, 1899.

Application filed September 11, 1899. Serial No. 730,151. (No model.)

To all whom it may concern:

Be it known that I, ROBERT M. DOWNIE, a citizen of the United States, residing at Beaver Falls, in the county of Beaver and State of Pennsylvania, have invented a new and useful Dredger for Use in Wells, of which the following is a specification.

This invention relates to dredgers for use in wells or tubes sunk into the earth, and has for its object to provide a simple and effective dredging-machine wherein all of the operative parts of the machine are housed within the tubular casing designed to be introduced into a well, the parts of the machine being so combined that they may be readily operated from the surface of the earth and all parts effectually protected and inclosed within a casing, with the exception of such portion of the dredger as is performing the dredging operation, such portion projecting sufficiently below and beyond the lower end of the casing to take up the materials at that point. The machine contemplates means whereby the depth of penetration of the machine may be increased or diminished at will and as occasion may demand and according as to whether soft or hard material is being operated upon. The dredger is designed to be used in connection with and auxiliary to a well boring or drilling machine and is intended for the purpose of extracting from the bottoms of bored or drilled wells or pipes any minerals—such as, for example, mercury, lead, gold, or other heavy substance.

The operation and purpose of the present invention will be fully understood from the accompanying drawings and the subjoined description.

The invention consists in a dredger for use in wells embodying certain novel features and details of construction and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and incorporated in the claims.

In the accompanying drawings, Figure 1 is a side elevation of a dredger constructed in accordance with the present invention. Fig. 2 is a longitudinal sectional view of the same. Fig. 3 is an enlarged detail longitudinal section through the upper portion of the casing, showing the upper roller and the adjustable stirrup or yoke which carries said roller. Fig. 4 is a similar view through the lower portion of the casing, showing the lower roller and the manner of mounting the same. Fig. 5 is a horizontal section taken on the line *x x* of Fig. 3, showing the cap or head of the casing in plan view. Fig. 6 is an enlarged section on the line Y Y of Fig. 4. Fig. 7 is an enlarged detail longitudinal section on the line Z Z of Fig. 6.

Similar numerals of reference designate corresponding parts in all figures of the drawings.

The dredger contemplated in the present invention comprises, essentially, a tubular casing 1, which is preferably cylindrical and the length of which is made suitable to the well to be operated upon, the preferred length being about six feet. The external diameter of the casing is somewhat less than the internal dimensions of the well, so that there will be no difficulty in inserting the tool in the well and withdrawing the same therefrom. The lower end of the casing is left open and unobstructed, so that the dredging apparatus or conveyer may be operated freely at and through the bottom thereof, while the upper end of the casing is for the greater part closed by a cap or head 2, which may be secured fixedly to the casing by any usual or preferred means—such as, for example, screws 3.

Housed within the casing 1 is a conveyer, which in the preferred embodiment of the invention consists of an endless chain or buckets, 4 indicating the chain, and 5 a plurality of buckets suitably attached thereto at intervals. This endless carrier or chain is mounted upon rollers 6 and 7, located, respectively, at or adjacent to the upper and lower ends of the casing and within the same. Each of the rollers 6 and 7 is grooved, as shown at 8, to receive and guide the chain, or, in other words, each roller is provided with circumferential flanges 9, spaced a suitable distance apart on the roller to receive and properly guide and direct the movement of the chain. I do not, however, limit myself to this particular form of grooved roller, but any other form may be substituted.

The upper roller 6 is mounted upon a spindle 10, which is in turn mounted terminally

in the pendent arms 11 of an adjustable yoke or stirrup 12, the upper connecting bar or portion 13 of which is provided with threaded openings 14 to receive the threaded shanks of a pair of adjusting-screws 15, upon which the stirrup or yoke is hung and by means of which it may be adjusted up and down to provide greater or less tension on the conveyer and for the further object of enabling the conveyer as a whole to be bodily adjusted up and down for increasing or diminishing and thus regulating the depth of penetration of that part of the apparatus which performs the dredging operation. The upper portions of the adjusting or tension screws 15 are journaled in openings 16 in the head or cap 2, and the heads of said screws are formed to receive a suitable wrench for the purpose of effecting the adjustment hereinabove referred to. The head or cap 2 is provided with a depending flange 17, extending downward within the upper end of the casing 1, and said flange is provided at diametrically opposite points with slots 18, forming vertical or longitudinal ways and guides in which the yoke or stirrup 12 is received, and thus the said yoke or stirrup is steadied and guided in its up-and-down movements when being adjusted by the means set forth.

The lower roller 7 is mounted upon a spindle 19, the ends of which are received in bearings or brackets 20, mounted within the lower portion of the casing at diametrically opposite points. In order to provide for vertical adjustment of the roller 7, the brackets 20 are so constructed and associated with the casing that they may be moved up or down and held at any desired point. In order to attain this result, each bracket 20 is provided with oppositely-extending ears 21, and these ears are vertically slotted, as shown at 22, to receive a plurality of bolts or fasteners 23, which pass through the casing 1 at the proper points and engage threaded openings in plates 24, seated against the inner surfaces of the ears 21. This construction is clearly shown in Figs. 6 and 7, and upon reference thereto it will be apparent that by loosening the screws 23 and relieving the clamping action of the plates 24 the bearing-brackets 20 may be moved up or down, as occasion may require, after which the screws 23 are tightened for holding the brackets securely in their adjusted positions. Before adjusting the brackets 20 it may be necessary to lower the stirrup or yoke carrying the upper roller 6, and this may accordingly be done when necessary. It will now be seen that by the adjustment hereinabove described the depth of penetration of the dredging portion of the apparatus may be regulated at will, and it may here be stated that in soft formations or when operating upon a sharply-concaved bottom the dredging portion of the apparatus must project below the casing to a greater distance than where the bottom of the well is flat or the formation hard. The buckets 5 are preferably of substantially quadrantal form, being the largest at their mouths or receiving portions and tapering or rounding therefrom toward the bottom, so that the mouths will afford the greatest projection and the bottom portions thereof recede, so as to obviate interference and contact with the bottom of the well.

The means for operating the conveyer or carrier consists of a pair of slide-bars 25, arranged parallel to each other and extending through slots 26 in the head or cap 2 at diametrically opposite points. These slide-bars are yoked together or connected at their upper ends by means of a bail 27, the arms or branches 28 of which are bolted or otherwise suitably secured to said bars, as shown at 29. The bail 27 is provided at its upper end with an eye 30 to receive a suitable suspending and operating rope or cable. The bars 25 extend longitudinally within the casing 1 to a point near the lower roller, where they are connected by a pin 31, upon which is journaled a trip-dog or pawl 32, the free end of which is adapted to engage the chain of buckets for the purpose of drawing upward thereon when the bars 25 are moved in a corresponding direction. The trip-dog 32 is also adapted to move automatically from the full-line position shown in Fig. 2 to the dotted-line position shown in the same figure upon the downward or return movement of the bars 25, and in order to prevent the dog from falling over to the opposite side and becoming ineffective the upward movement of the dog is limited by means of a stop projection 33 on one or both of the bars 25. From the foregoing it will be observed that by drawing upward on the bail 27 and sliding the bars 25 in a corresponding direction the projecting end of the trip-dog 32 will engage with one of the buckets 5 or directly with the chain 4, and as the upward movement of said parts is continued the buckets will be successively projected below the bottom of the casing and scoop up the material at the bottom of the well. When the trip-dog 32 reaches the upper limit of its movement, it comes in contact with the upper roller 6 and terminates the operation of the carrier or conveyer. In the further upward movement of the bail 27 the casing 1 is carried upward, and in this way the whole device is withdrawn from the well. In order to remove the material so dredged, the lower end of the casing is preferably placed in a bucket or other receptacle, and the bail 27, together with the bars 25 and the trip-dog, having been lowered to their full extent the bail 27 is again drawn upward, whereupon the trip-dog, which has slipped by the buckets and links of the chain in its downward movement, reëngages the conveyer, and when the bail is again drawn upward the buckets are successively carried over the upper roller and emptied of their contents. In order to effectually remove the material, openings 34 are provided in the sides of the casing 1, near the upper end thereof, and

other openings 35 in the cap or head 2, the said openings being adapted to admit one or more streams of water wherewith to flush the casing and wash the minerals downward into the receptacle in which the casing is placed. In order to strengthen the head or cap 2 and compensate for the weakening of the same by the formation of the openings 35, the said head or cap is provided with a reinforcing rib or flange 36, which extends around and incloses both of said openings.

From the foregoing description it will be seen that I have provided a simple and effective dredger for use in drilled wells, which may be readily used for bringing to the surface minerals or other material in the bottom of the well. The efficiency of the machine is greatly increased by providing for the adjustment of the conveyer, to the end that the depth of penetration of the dredging portion of the apparatus may be increased or diminished according to existing conditions and other requirements. It will also be seen that the operating mechanism for the conveyer is extremely simple in construction, not liable to get out of order, the lifting strain is applied directly to the chain, and the conveyer-operating means also constitute the means whereby the device as a whole is lifted out of the well.

The tool as a whole is lowered into and raised from a well by a rope like an ordinary sand-pump. It may also be used in connection with a pipe lowered to the bed of a river, lake, or other body of water for scooping up sediment and delivering the same at the surface. In fact, the tool may be lowered from a boat to the bottom of a body of water and samples of sediment or deposits taken up without an auxiliary pipe and with the aid only of a raising-and-lowering rope or cable.

The essential feature of the present invention consists in the employment, in connection with a tubular casing, of a dredging-conveyer, the dredging portion of which operates below the lower end of the casing, and while the preferred embodiment of the conveyer is illustrated in the drawings as consisting of an endless chain of buckets it is to be understood that other forms or types of conveyers may be employed. It will therefore be apparent that the form and construction of the dredger and conveyer may be varied and also that other changes in the size, shape, proportion, and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus described the invention, what is claimed, and desired to be secured by Letters Patent, is—

1. In a dredger for use in wells, a casing adapted to fit within the well, in combination with a dredging-conveyer having its dredging portion exposed for action outside of one end of the casing, substantially as described.

2. In a dredger for use in wells, the combination of a tubular casing, a dredging-conveyer housed therein and adapted to project beyond the lower end thereof, and means operating within the casing for actuating said conveyer.

3. In a dredger for use in wells, the combination of a tubular casing, a dredging-conveyer housed therein, and means for adjusting the conveyer within the casing, substantially as described.

4. In a dredger for use in wells, a casing adapted to fit within the well, in combination with a dredging-conveyer having its dredging portion exposed for action outside of one end of the casing, a support for the upper end of said conveyer and means for adjusting said support independently of the lower support, substantially as described.

5. In a dredger for use in wells, the combination of a tubular casing, a dredging-conveyer housed therein, and having its dredging portion projected beyond the lower end of the casing, and means within the casing for raising and lowering the lower end of the conveyer.

6. In a dredger for use in wells, a casing adapted to fit within the well, in combination with a dredging-conveyer having its dredging portion exposed for action outside of one end of the casing, and means contained within the casing for regulating the depth of penetration of said dredging portion, substantially as described.

7. In a dredger for use in wells, the combination of a tubular casing, a dredging-conveyer housed therein, and an operating device extending longitudinally within the casing and adapted to engage said conveyer for imparting motion thereto, substantially as described.

8. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, and an operating device movable longitudinally within the casing and carrying means for engaging and operating said conveyer, substantially as described.

9. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, a bar movable longitudinally within the casing, means carried by said bar for intermittently engaging and operating the conveyer, and operating means for said bar.

10. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, a slide-bar movable longitudinally within the casing, a trip-dog carried by said bar for engaging and operating the conveyer, and operating means for said bar.

11. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, a slotted cap or head for the casing, parallel slide-bars pass-

ing through said slotted cap or head, and extending longitudinally within the casing, means carried by said bars within the casing for engaging and operating the conveyer, and a connection at the outer ends of said bars, substantially as described.

12. In a dredger for use in wells, the combination of a tubular casing, an endless conveyer housed therein, upper and lower rollers on which a conveyer is mounted, a movable yoke or stirrup for the upper roller, and means for adjusting said yoke up and down, substantially as and for the purpose specified.

13. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, upper and lower rollers for said conveyer, a movable yoke or stirrup for the upper roller, a head or cap for the casing provided with a flange having guideways for said yoke, and means for adjusting the yoke up and down, substantially as specified.

14. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, upper and lower rollers for said conveyer, a yoke or stirrup for the upper roller, a head or cap for the casing having a depending flange provided with guideways for the yoke, and adjusting-screws interposed between said cap or head, and the yoke, substantially as specified.

15. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, upper and lower rollers for said conveyer, and bearings for the lower roller adjustable longitudinally within the casing, substantially as described.

16. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, upper and lower rollers for said conveyer, brackets for the lower roller arranged within the casing and provided with slots extending longitudinally of the casing, plates arranged adjacent to the slotted portions of the brackets, and fasteners passing through the casing and slotted portions of the brackets and engaging said plates, substantially as described.

17. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, an operating device movable longitudinally within the casing, conveyer-engaging means carried by said operating device, and a fixed part within the casing coöperating with said conveyer-engaging device, whereby the machine as a whole may be elevated, substantially as described.

18. In a dredger for use in wells, the combination of a tubular casing, an endless dredging-conveyer housed therein, rollers upon which said conveyer is mounted, and an operating device adapted to engage said conveyer and movable from one roller to the other, substantially as described.

19. In a dredger for use in wells, the combination of a tubular casing provided at or near its upper end with flushing-openings, a dredging-conveyer housed and working within said casing, and operating means for said conveyer, substantially as described.

20. In a dredger for use in wells, the combination of a tubular casing, an endless chain housed within said casing and provided at intervals with dredging and hoisting buckets adapted to be successively projected below the lower end of the casing, and operating means for said chain.

21. In a dredger for use in wells, the combination of a tubular casing, a dredging-conveyer housed therein and having its dredging portion operating beyond the lower end of the casing, and means for adjusting the conveyer up and down within the casing to regulate the depth of penetration of said dredging portion, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

ROBERT M. DOWNIE.

Witnesses:

FREDRICK W. RANSOM,

ROBT. G. FORBES.